Ori D. Fox

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EDUCATION:

Ph.D. in Astronomy, University of Virginia, Charlottesville, VA	2010
M.Sc. in Astronomy, University of Virginia, Charlottesville, VA	2006
B.A. in Astronomy & Physics, *with honors*, Boston University, Boston, MA	2003

APPOINTMENTS:

Postdoc, UC Berkeley, CA	2012 –
NASA Fellow, Goddard Space Flight Center, MD	2010 – 2012
NASA Graduate Student Fellow, Goddard, Greenbelt, MD	2006 – 2009
Graduate Student, University of Virginia, Charlottesville, VA	2004 – 2010
Assistant Staff, MIT Lincoln Laboratories, Lexington, MA	2003 – 2004
Researcher, Boston University Astronomy Dept., Boston, MA	2002 – 2003
NASA Undergrad Fellow, Jet Propulsion Lab, Pasadena, CA	Summer 2002

RELEVANT SKILLSET AND ACHIEVEMENTS:

- Laboratory Systems
- Infrared Instrumentation and Sensor/Detector R&D
- Large Database Search and Analysis
- 21 professional journal publications
- Principal Investigator of 5 NASA research programs totaling over $150,000
- Manager of a $200,000 project that employed 8 undergraduate part-time students
- 9 Colloquia and/or Seminars at major universities
- 11 Invited and/or Contributed talks at international conferences
- *Computer Languages:* IDL, MATLAB, C++, Python, Fortran, UNIX
- *Computer Software:* Microsoft Office (Word/Excel/Powerpoint), LabView system design, Zemax optical design, Mechanical Desktop

AWARDS:

- NASA's Robert H. Goddard Award for Exceptional Achievement in Engineering awarded to the JWST NIRSpec Detector Team, 2011
- NASA Postdoctoral Program Fellowship, 2010-Present
- Virginia Space Grant Consortium Fellowship, 2009-2010
- NASA Student Ambassador, 2009-2010
- NASA's Graduate Student Research Program (GSRP), 2006-2009

- Achievement Reward for College Scientists (ARCS), 2006-2007
- UVa Astronomy Department Larry Fredrick Teaching Award, 2006
- Phi Beta Kappa (Early Induction), 2002
- NASA's Undergraduate Student Research Program (USRP), 2001

RESEARCH & PROFESSIONAL EXPERIENCE:

Department of Astronomy, University of California, Berkeley, CA

Postdoc for Advisor Alex Filippenko Sep. 2012 to Present

- Define projects, write proposals, analyze and interpret data, and disseminate results through publication in journals, technical reports, and requirements documents, and presentations at seminars and scientific conferences.
- Calibrate and characterize the RATIR camera, which I helped to build (see below). Develop data reduction and analysis pipeline. Maintain database.
- Observe, Reduce, and Analyze photometry and spectroscopic data from telescopes, including the *Hubble Space Telescope*, *Spitzer Space Telescope*, *Chandra Space Telescope*, and the Keck 10-m telescopes located in Mauna Kea, Hawaii.
- Research supernova explosions that show late-time signatures of interaction at X-ray, ultraviolet, visible, infrared, and radio wavelengths. Derive progenitor mass-loss rates and explosion mechanisms. Identify the origin and heating mechanism of warm dust found in these environments. Answer larger questions regarding stellar and galactic evolution, which are primary focuses of the Astronomy Decadal Review.

NASA, Goddard Space Flight Center, Greenbelt, MD

NPP Fellow/Postdoc for Advisor Harvey Moseley Jul. 2010 to Aug. 2012

- Project Website: http://butler.lab.asu.edu/RATIR/
- Support the construction (mechanical, cryogenic, optical, and electronic systems), commissioning, and early science of the **R**eionization **A**nd **T**ransient **I**nfra**R**ed camera (**RATIR**), a simultaneous visible/IR camera developed for transient astronomy. Mounted and commissioned in Summer 2012 at the 1.5-meter telescope of the Observatorio Astronomico Nacional on Sierra San Pedro Martir in Baja California, Mexico.
- Lead the integration and testing of the RATIR electronic subsystems, which includes two Teledyne H2RG IR detectors/sensors and SIDECAR-ASIC/JADE card readout electronics. Characterization properties include read noise, dark current, and conversion gain. We are one of the first teams in the world to utilize ASICs, which were originally developed for NASA's James Webb Space Telescope (JWST).
- Research includes handling detectors, managing cryo-vac stability, designing hardware and electronics, and developing software to operate the system and analyze data.

Department of Astronomy, The University of Virginia, Charlottesville, VA
http://www.astro.virginia.edu/research/instrumentation/

Fellowship Supported Graduate Student 2004-2010
(Part of this research was supported by the NASA GSRP Fellowship described below.)

- Observe, Reduce, and Analyze photometric and spectroscopic data of supernovae with late-time infrared emission. Use circumstellar dust to probe the late stages of the star's evolution and explosion physics, as well as the role supernovae play in the production and redistribution of dust in the universe.
- Maintain and Upgrade the infrared camera at the local 1-m hand equipped telescope, which required engineering upgrades of both hardware and software every few months.
- Hire, Train, Mentor, and Manage 10 undergraduates to implement a long-term supernova monitoring campaign with the infrared camera described above. Co-propose and win a $200,000 National Science Foundation (NSF) grant to support the students. Publish the results. The overall effort aimed to strengthen Science Technology Engineering and Mathematics (STEM) research at the undergraduate level.
- Construct experiments to characterize a new generation of IR detectors.
- Design and Commission instruments, specifically a custom Geneva gear slit exchange mechanism for the TripleSpec spectrograph, a permanent instrument at Apache Point Observatory, NM that we built at the University of Virginia and provided data for my thesis.

Detector Characterization Laboratory, NASA Goddard, Greenbelt, MD

Graduate Student Research Fellow (GSRP) 2006 - 2009
(The work performed at NASA Goddard supported part of my thesis completed at UVA.)

- Improve the scientific performance of the infrared detectors (Teledyne's H2RGs) that will be used in NASA James Webb Space Telescope (JWST) Near-Infrared Spectrograph (NIRSpec). Collaborate with NASA Detector Characterization Laboratory (DCL). Increase the detector sensitivity and reduce external noise effects. Foresee potential limitations and resolve these complications with advanced analysis methods.

MIT Lincoln Laboratories, Lexington, MA

Assistant Staff September 2003 to September 2004 (Full Time)
Radar Intelligence, Test, and Evaluation Group

- Coordinate interface techniques between different data collecting centers to improve the radar performance of missile detection and tracking.
- Independently develop radar search algorithms.
- Collaborate with other defense contractor institutions, such at the Johns Hopkins Advanced Physics Laboratory (APL).

Boston University Astronomy Dept., Boston, MA

Undergraduate Research Assistant September 2002 to May 2003

- Collect data to map the Milky Way at radio wavelengths with the Five College Radio Astronomy Observatory (FCRAO) 14-m radio telescope.

- Disentangle distances to star forming regions that are complicated by galaxy geometry.
- Document the results in an undergraduate senior independent study project.

NASA Jet Propulsion Laboratory, Pasadena, CA

Undergraduate Fellowship (USRP) Summer 2002

Planetary Sciences Division

- Research Jupiter's atmosphere with NASA JPL senior scientists using data collected from the InfraRed Telescope Facility (IRTF) at Mauna Kea, Hawaii.
- Model the pressure of Jupiter's atmosphere as a function of latitude.
- Resolve long-standing question about the origin of a static, cold mass of air at Jupiter's north pole.

TEACHING EXPERIENCE:

The University of Virginia, Charlottesville, VA

Teaching Assistant (10 hours per week) 2004 - 2006

- TA for ASTR 121 (Intro to Sky/Solar System), ASTR 124 (Intro to Stars, Galaxies, and the Universe), ASTR 130 (Intro to Astronomical Observation), and ASTR 511 (Astronomical Techniques), including substitute lecturing responsibilities.
- Lecture students on course subject matter. Conduct weekly laboratory sessions at the undergraduate telescope facility. Maintain the quality of the laboratory facility to ensure classes were conducted efficiently. Administer tests. Tutor students.
- Earn the UVA Larry Fredrick Astronomy TA of the Year Award (2006)

PI for Supernova Survey (10 hours per week) 2006 - 2010

- Train 10 undergraduate students with telescope hardware and software.
- Teach undergraduates data reduction techniques.
- Mentor undergraduates as they progressed through their research, which resulted in a published paper of which the entire team was a part.

DEPARTMENT COLLOQUIA AND SEMINARS:

9 since January 2010: Boston University • Colorado-Boulder • Harvard/CfA • NASA Goddard Space Flight Center (GSFC) • Space Telescope Science Institute (STScI) • UC Berkeley • UC Santa Barbara • UT Austin • University of Virginia

INVITED & CONTRIBUTED TALKS:

SPIE Astronomical Instrumentation, Amsterdam, The Netherlands	Jul. 2012
Joint Space-Science Institute, NASA Goddard	May 2012
Type Ia Supernovae in the Near Infrared, U. of Pittsburgh, PA	Mar. 2012
The Physics of Astronomical Transients, Aspen, CO	Jan. 2012
Explosive Ideas about Massive Stars, University of Stockholm, Sweden	Aug. 2011
Intermediate-Luminosity Red Transients, Space Telescope Science Institute	Jun. 2011
Detectors for Astronomy, European Space Organization, Germany	Oct. 2009
Supernova Conference (Poster Only), CalTech, Pasadena, CA	Aug. 2009
Congressional Visits with Citizen's for Space Exploration, Washington, DC	Apr. 2009
NASA Graduate Student Symposium, NASA Goddard, Greenbelt, MD	Sep. 2008
SPIE Astronomical Instrumentation, Marseille, France	Jun. 2008
SNAP Collaboration Meeting, Fermi Lab, Batavia, IL	May 2008
JWST Partners Workshop (Poster Only), Dublin, Ireland	Jun. 2007

RESEARCH GRANTS (all PI Fox):

– "X-Ray Signatures of Late-Time Circumstellar Interaction in Type IIn Supernova"
Chandra Cycle 14, 95 ksec 2012-2013
– "A Search for Missing Dust in Nearby Core-Collapse Supernovae"
Herschel Cycle 2 Tier 2, 14.8 hours 2011-2012
– "Constraining the Origin and Heating Mechanism of Dust in Type IIn Supernovae"
Spitzer Cycle 8, 9.3 hours 2011-2012
– "A Survey for Dust in Type IIn Supernovae"
Spitzer Cycle 6, 22.4 hours 2009-2010
– "Late time IR emission from an extremely luminous Type IIn supernova: SN 2005ip"
Spitzer Cycle 5, 2.9 hours 2008-2009

OBSERVING & DATA ANALYSIS EXPERIENCE:

Infrared:	Spitzer/IRAC/IRS, APO/TripleSpec, UVA/FanCam, SPM/RATIR
Optical:	HST/STIS, Keck/LRIS, Lick/KAST, SPM/RATIR
Ultraviolet:	HST/WFC3

OBSERVING PROGRAMS (all PI Fox):

Spitzer/IRAC	Cycle 6 (2009, 22.4 hours), Cycle 8 (2011, 9.3 hours)
Spitzer/IRS	Cycle 5 (2008, 2.9 hours)
Herschel/PACS	Cycle 2 (2012, 14.8 hours)
APO/TripleSpec	2008-Q4, 2009-Q1, 2009-Q2, 2009-Q3, 2009-Q4
NOAO/SMARTS	2008B

PROFESSIONAL SERVICES:

Referee	ApJ, AJ
Reviewer	Spitzer DDT Proposal
Science Team Member	RATIR Transient Camera, LOBSTER (collaborator), Palomar Transient Factory (collaborator)
Professional Affiliations	AAS, SPIE

LEADERSHIP AND OUTREACH:

NASA Astrophysics Division Colloquium Committee, Member	2011 – 2012
NASA Supernova Journal Club, Chair	2011 – 2012
Lobbyist for astronomy and science interest groups	2009 –
Hired, Trained, and Managed 10 undergraduate students	2008 – 2010
Member of public outreach groups at UVA and NASA Goddard	2007 – 2012
Explore @ NASA Day	2010
Worlds Beyond Project	2008
Graduate adviser to the UVA undergraduate Astronomy Club	2009 – 2010

PUBLICATIONS:

First, Second, Third Author Publications

26. **Fox, O. D.**, et al. 2012, "Performance and Calibration of H2RG Detectors and SIDECAR ASICs for the RATIR Camera," Proc. Of SPIE, 8453, 59. In Press.

25. Butler, N. R., Klein, C. K., **Fox, O. D.**, et al. 2012, "First light With RATIR: An Automated 6-band Optical/NIR Imaging Camera," Proc. of SPIE 8446, 34. In Press.

24. **Fox, O. D.**, et al. 2011, "A Spitzer Survey for Dust in Type IIn Supernovae," ApJ, 741, 7.

23. **Fox, O. D.**, et al. 2010, "Disentangling the Origin and Heating Mechanism of Supernova Dust: Late-Time Spitzer Spectroscopy of the Type IIn SN 2005ip," ApJ, 725, 1768.

22. **Fox, O. D.**, et al. 2009, "The 55Fe X-ray Energy Response of Mercury Cadmium Telluride Near-Infrared Detector Arrays," PASP, 121, 743.

21. **Fox, O. D.**, et al. 2009, "Near-Infrared Photometry of the Type IIn SN 2005ip: The Case for Dust Condensation," ApJ, 691, 650.

20. Foley, R. J., Berger, E., **Fox, O. D.**, et al. 2009, "The Diversity of Massive Star Outbursts I: Observations of SN 2009ip, UGC 2773 OT2009-1, and Their Progenitors," ApJ, 732, 32.

19. **Fox, O. D.**, et al. 2008, "The 55Fe X-ray Energy Response of Mercury Cadmium Telluride Near-Infrared Detector Arrays," Proc. of SPIE, 7021, 702123.

18. Rauscher, B. J., **Fox, O. D.**, et al., 2007, "Detectors for the James Webb Space Telescope Near-Infrared Spectrograph," PASP, 119, 768R.

Other Publications

26. Stritzinger, M., et al. 2012, "Multi-wavelength Observations of the Enduring Type IIn Supernovae 2005ip and 2006jd," ApJ, In Press, arXiv:1206.5575.

25. Farah, A., et al. 2012, "Mechanical Design and Integration of the Support Structure for the Reionization and Transients Infrared Instrument RATIR," Proc. of SPIE 8446, 372. In Press.

24. Klein, C. R., et al. 2012, "Software Solution for Autonomous Observations With H2RG Detectors and SIDECAR ASICs for the RATIR Camera," Proc. of SPIE 8453, 102. In Press.

23. Kutyrev, A. S., et al. 2012, "Infrared Camera for Reionization and Transients Infrared Camera (RATIR) Project," Proc. of SPIE 8446, 368. In Press.

22. Kutyrev, A. S., et al. 2012, "Rapid infrared imager-spectrometer (RIMAS) for the Discovery Channel Telescope," Proc. of SPIE 8446, 170.

21. Kutyrev, A. S., et al. 2012, "First light with the high resolution near infrared spectrometer for zodiacal light studies," Proc. of SPIE 8446, 169. In Press.

20. Watson, A. M., et al. 2012, "Automation of the OAN/SPM 1.5-meter Johnson Telescope for Operations With RATIR," Proc. of SPIE 8444, 214. In Press.

19. Soderberg, A. M., et al. 2009, "Discovery of a Relativistic Supernova Without a Gamma-Ray Trigger," Nature, 463, 513.

18. Levesque, E. M., et al. 2009, "The High-Metallicity Explosion Environment of the Relativistic Supernova 2009bb," ApJL, 709, 26.

17. Rauscher, B. J., et al. 2008, "JWST Near-Infrared Spectrograph: Dark Performance of the First Flight Candidate Detector Arrays," Proc. of SPIE, 7021, 24.

16. Mott, D. B., et al. 2008, "Characterization of the detector subsystem for the near-infrared spectrograph (NIRSpec) on the JWST," Proc. of SPIE, 7021, 27.

15. Nelson, M., et al. 2006, "Development of Extended Wavelength Response InGaAs Detectors for Astronomical Applications," Proc. of SPIE, 6276,1.

Circulars

26. Cao, Y., et al. 2012, "Discovery and classification of four novae in M31," ATEL, 4193.

25. **Fox, O. D.**, et al. 2010, "Spitzer Detection of Late-Time (over 100 d) Infrared Emission from Warm Dust in 9 Type IIn Supernovae," ATel, 2665.

24. Sivakoff, G. R., et al. 2009, "Aql X-1 transition towards the soft (banana) state accompanied by radio/NIR detection," ATel, 2302.